

TOROPOV, N.A.; GALAKHOV, F.Ya; KONOVALOVA, S.F.

Rare earth silicate elements. Report No.9: Solid
solutions formed by yttrium and erbium silicates. Izv. AN SSSR.
Otd.khim.nauk no.5:738-743 My '62. (MIRA 15:6)
(Yttrium silicates) (Erbium silicates) (Solid solutions)

TOROPOV, N.A.; GREBENSHCHIKOV, R.G.

Laminated barium dimetasilicates: $MgBaSi_4O_{10}$ and $Ba_2Si_4O_{10}$
compounds. Zhur.neorg.khim. 7 no.2:337-345 F '62. (MIRA 15:3)

(Barium silicates)

TOROPOV, N.A.; VASIL'YEVA, V.A.

Phase diagram of the binary system scandium oxide - silica.
Zhur. neorg. khim. 7 no.8:1938-1945 Ag '62. (MIRA 16:6)

(Scandium oxide) (Silica)

TOROPOV, N.A.; KALER, E.K.; LEONOV, A.I.; RUMYANTSEV, P.F.

High-temperature microscope. Vest. AN SSSR 32 no.3:46-48 Mr
'62. (MIRA 15:2)

(Microscope)
(Materials at high temperatures)

TOROPOV, N.A.

Eighth International Congress on Ceramics. Vest. AN SSSR 32
no. 8:98-99 Ag '62. (MIRA 15:8)

1. Chlen-korrespondent AN SSSR.
(Ceramics--Congresses)

TOROPOV, N.A.; SIRAZHIDDINOV, N.A.

Phase diagram of the system MgAl_2O_4 - NdAlO_3 . Izv. AN SSSR. Otd. khim. nauk no. 2: 374-376 F. '63. (MIRA 16:4)

1. Institut khimii silikatov im. I.V. Grebenshchikova AN SSSR.
(Magnesium aluminates) (Neodymium aluminates)

TOROPOV, N.A.; FEDOROV, N.F.; SHEVYAKOV, A.M.

Infrared absorption spectra of polymorphic modifications of
dicalcium silicate. Zhur.nerog.khim. 8 no.1:69-71 Ja '63.
(MIRA 16:5)

(Calcium silicates--Spectra)

TOROPOV, N. A.; LUGININA, I. G.

New developments concerning the dissociation of cement carbonates. TSement 29 no.2:4-6 Mr-Ap '63.

(MIRA 16:4)

1. Institut khimii silikatov AN SSSR i Kazakhskiy tekhnologicheskiy institut.

(Carbonates) (Cement clinkers)

TOROPOV, N.A.; FEDOROV, N.F.

Binding properties of various modifications of dicalcium silicate.
Zhur.prikl.khim. 35 no.12:2585-2588 D '62. (MIRA 16:5)
(Calcium silicates) (Binding materials)

VOLKONSKIY, Boris Vasil'yevich; KONOVALOV, Pet. Fedorovich; MAKASHEV,
Sergey Dmitriyevich; TORPOV, N.A., doktor tekhn. nauk, prof.,
red.; MAKASHEV, S.D., nauchn. red.

[Mineralizers in the cement industry] Mineralizatory v tsement-
noi promyshlennosti. Moskva, Stroiizdat, 1964. 197 p.
(MIRA 17:4)

1. Chlen-korrespondent AN SSSR (for Toropov).

TOROPOV, N.A.; STRAZHIDDINOV, N.A.

Effect of rare-earth oxides on the kinetics of magnesium
aluminate formation in the solid phase. Uzb. khim. zhur. 7
no.5:38-42 '63. (MIRA 17:2)

1. Leningradskiy tekhnologicheskij institut imeni Lensoвета.

GREBENSHCHIKOV, R.G.; TOROPOV, N.A.; SHITOVA, V.I.

Crystal phases of the system barium oxide - germanium
dioxide. Dokl. AN SSSR 153 no.4:842-844 D '63.

(MIRA 17:1)

1. Institut khimii silikatov im. I.V. Grebenshchikova AN
SSSR. 2. Chlen-korrespondent AN SSSR (for Toropov).

TOROPOV, N.A.; SHIRVINSKAYA, A.K.

Solid solutions in the system Ca SiO_3 - Ca GeO_3 . Dokl. AN SSSR
153 no.5:1081-1084 D '63. (MIRA 17:1)

1. Institut khimii silikatov im. I.V. Grebenshchikova
AN SSSR. 2. Chlen-korrespondent AN SSSR (for Toropov).

TOROPOV, N.A.

Sitalls, a new inorganic material in modern technology. Vest.
AN SSSR 33 no.10:43-46 0 '63. (MIRA 16:11)

1. Institut khimii silikatov im. I.V. Grebenshchikova.

TOROPOV, N.A.; VASIL'YEVA, V.A.

Phase relations in the system scandium oxide - aluminum oxide.
Dokl. AN SSSR 152. no.6:1379-1382 0 '63. (MIRA 16:11)

1. Institut khimii silikatov AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Toropov).

TOROPOV, N.A.; FEDOROV, N.F.; SHEVIYAKOV, A.M.

Infrared absorption spectra of the orthosilicates of some
bivalent elements. Zhur. neorg. khim. 8 no.6:1342-1344
Je '63. (MIRA 16:6)

(Silicates—Absorption spectra)

SOURCE: RZh. Khimiya, Abs. 8B415

AUTHOR: Bondar', I. A.; Korolyeva, L. N.; Toropov, N. A.

TITLE: A diagram of the composition of a binary system of ytterbium oxide-silicon dioxide and a comparison of it with other system of Ln sub 2 0 sub 3-SiO sub 2

CITED SOURCE: Tr. 6-go Soveshchaniya po eksperim. i tekhn. mineralogii i petrogr., 1961. M., AN SSSR, 1962, 303-310

TOPIC TAGS: ytterbium oxide, lanthanum oxide

TRANSLATION: The phase diagram of the system Yb sub 2 0 sub 3 - SiO sub 2 was investigated, and a comparison was carried out with other diagrams of Ln sub 2 0 sub 3 - SiO sub 2. In all systems, the compounds Ln sub 2 0 sub 3-SiO sub 2 and 2Ln sub 2 0 sub 3-SiO sub 2 melt without decomposition; the compounds Ln sub 2 0 sub 3.2SiO sub 2 in the systems Er sub 2 0 sub 3 - SiO sub 2 and

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ACCESSION NR: AR3003582

Yb sub 2 O sub 3 - SiO sub 2 melt without decomposition, and in the remaining systems they melt with decomposition into 2Ln sub 2 O sub 3 · 2SiO sub 2 and liquid. The region of phase separation increases upon transition from elements with a large ionic radius to elements with a smaller ionic radius. A calculation of the limiting composition for phase separation, i.e., a calculation of the composition of the liquid, corresponding to the transition from the region of two glasses into regions of homogeneity, was carried out according to the oxygen-volume method on the basis of full radii of oxygen and the cation-modifier and the type of their bond. The results obtained are in agreement with experimental data. Ya. Shenkin

DATE ACQ: 12Jun63

SUB CODE: CH

ENCL: 00

Card 2/2

35444

S/030/62/000/003/003/007
B116/B104

24,3300 (1051,1057,1163)

AUTHORS: Toropov, N. A., Keler, E. K., Leonov, A. I., Rumyantsev, P. E

TITLE: High-temperature microscope

PERIODICAL: Akademiya nauk SSSR. Vestnik, no. 3, 1962, 46-48

TEXT: A high-temperature microscope developed at the Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR) is described. Its main components are: the MW-5 (MP-3) polarizing microscope, a high-temperature chamber attached to the microscope stage, and a lamp. The heater 1 (Fig. 1) in the chamber is controlled by the economy transformer 2 (2 a) and the step-down transformer 3 (220/6 v). The lamp 6 is controlled by the economy transformer 7 (2 a, 220/127 v). The temperature is measured by the Pt-Rh thermocouple 8 and the potentiometer 9. The temperature of microobjects can also be determined by measuring the voltage at the heater. The microscope features microtelephoto lenses with an operating distance of about 14 mm. Maximum magnification is 240. Melting, crystallization, and polymorphous conversions of crystalline substances can be observed at high temperature in the

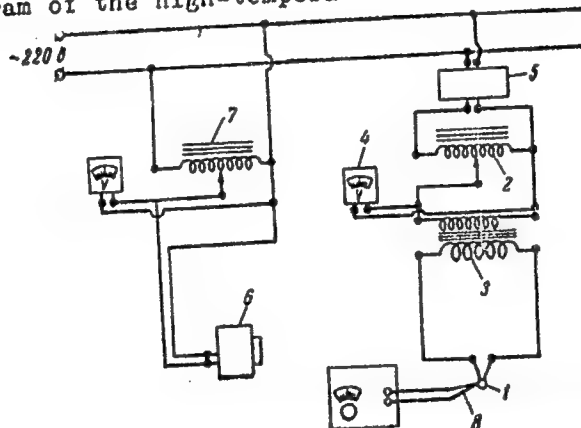
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S/030/62/000/003/003/007
B116/B104

High-temperature microscope

transmitted polarized light and in the reflected light. The wetting of metals with nonmetallic liquids can be studied. Experiments can be conducted in oxidizing, inert, and reducing gas media. There are 4 figures.

Fig. 1. Circuit diagram of the high-temperature microscope.



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AUTHORS:

Bondar', I. A., Galakhov, F. Ya., and Toropov, N. A.

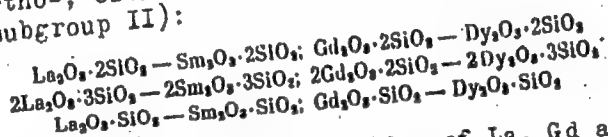
TITLE:

Silicates of rare-earth elements. Communication 7:
Solid solutions between the silicates of lanthanum and
samarium, gadolinium and dysprosium

PERIODICAL:

Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh
nauk, no. 3, 1962, 377-382

TEXT: The interaction of rare-earth silicates was studied on binary
systems of oxyortho-, ortho- and diorthosilicates of La and Sm (subgroup I)
and Gd and Dy (subgroup II):



The mixtures of pure ($\sim 98.2-99.9\%$) oxides of La, Gd and Si (crystallized
silica) were tempered at $2000-1500^\circ\text{C}$ in a microvacuum- and platinum
rhodium furnace (40 % Rh). In binary systems of monotypic compounds of the

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Silicates of rare-earth elements...

silicates of La and Sm, Gd and Dy, continuous series of solid solutions are formed, as their composition and structure are similar and the ionic radii lie close together (La = 1.22 Å, Sm = 1.13 Å, Gd = 1.11 Å, Dy = 1.07 Å). The following systems are typical: (1) diorthosilicates: $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ - $\text{Sm}_2\text{O}_3 \cdot 2\text{SiO}_2$, (2) orthosilicates: $2\text{Gd}_2\text{O}_3 \cdot 3\text{SiO}_2$ - $2\text{Dy}_2\text{O}_3 \cdot 3\text{SiO}_2$ and (3) oxyorthosilicates: $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ - $\text{Sm}_2\text{O}_3 \cdot \text{SiO}_2$. As these systems, with regard to the character of the change of liquidus and solidus curves, belong to the first type of solid solutions by Roozeboom, no decomposition of the solid solutions occurs at a temperature decrease to 1500°C. For isovalent isomorphism, in particular, a regularity between the phase diagrams and the difference of the cationic radii was determined. Up to 15 % difference, the phase diagrams belong to the first type by Roozeboom (La-Sm silicates: ~8 %, Gd-Dy silicates: ~4 % difference). As the diorthosilicates La, Sm, Gd, Dy ($\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$) decompose, during melting, into orthosilicates ($2\text{La}_2\text{O}_3 \cdot 3\text{SiO}_2$) and glass, a straight line in the phase diagrams separates the crystallization fields of the compounds 2:3 and 1:2. Monophase, granular or polygonal structures were microscopically determined

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Silicates of raro-earth elements...

in every system in the crystallized compositions for any component ratio. Single phase structure of solid solutions was observed only under near-equilibrium conditions (crystallizing from melts and longer heating). Insufficient heating and great temperature interval between liquidus and solidus produces disequilibrium crystallization of the solid solutions. As the diffusion processes are not terminated here, an inhomogeneous structure is formed (zonal structure). Longer tempering compensates the component concentration and causes granular structure. In all systems from oxy- and diorthosilicates the crystals are biaxial and optically positive, in the systems from orthosilicates they are monoaxial, optically negative and of hexagonal syngony. The optical refraction is for $\text{Sm}_2\text{Si}_2\text{O}_7$:

$n_g = 1.775$, $n_p = 1.765$, for $\text{La}_2\text{Si}_2\text{O}_7$: $n_g = 1.762$, $n_p = 1.752$.

Similarity of the monotypic silicates and continuous change of the interfacial spacings was established for all systems by X-ray phase analysis. The X-ray pictures of the systems $\text{Sm}_2\text{O}_3 \cdot 2\text{SiO}_2$ - $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ and

$2\text{Gd}_2\text{O}_3 \cdot 3\text{SiO}_2$ - $2\text{Dy}_2\text{O}_3 \cdot 3\text{SiO}_2$ confirmed the formation of homogeneous ranges.

When substituting $\text{La}_2\text{O}_3 \cdot 2\text{SiO}_2$ by various amounts of $\text{Sm}_2\text{O}_3 \cdot 2\text{SiO}_2$, or

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Silicates of rare-earth elements...

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$2\text{Gd}_2\text{O}_3 \cdot 3\text{SiO}_2$ by $2\text{Dy}_2\text{O}_3 \cdot 3\text{SiO}_2$, the diffraction maxima are displaced in the direction of the small values of d . There are 6 figures and 2 tables.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: October 4, 1961

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G/005/62/000/004/002/002
D029/D109

AUTHORS: Toropov, N.A., and Bondar, I.A. (Leningrad)
TITLE: Liquid separations in the systems rare earths - SiO_2
PERIODICAL: Silikattechnik, no. 4, 1962, 137-139

TEXT: The Institut fuer Silikatchemie der Akademie der Wissenschaften der UdSSR (Institute for Silicate Chemistry of the Academy of Sciences of the USSR) is carrying out experiments concerning silicates of rare earths and phase diagrams of binary systems $\text{R}_2\text{O}_3\text{-SiO}_2$ (R= La, Sm, Y, Yb, and others). Critical separation temperatures of all tested systems were between 2050 and 2200°C. The primary crystal phase precipitating below the separation area consisted of cristobalite. The explanation given by O.A. Jessin [Arb. d. 2.Unionskonferenz ueber theoretische und angewandte Elektrochemie, Verlag Akad.Wiss. USSR (Studies of the 2nd Union Conference on theoretical and practical Electrochemistry, published by the Academy of Sciences of the USSR) Kiyev 1949.] for systems with bivalent kations can be extended to the trivalent kations of rare earths. The area of separation

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D029/D109

Liquid separations in the systems ...

becomes larger during a transition from an element with large ion radius (La, separation starts at 77 mol% SiO₂) to an element with smaller ion radius (Yp, separation starts at 73.7 mol% SiO₂). For the composition limits of batches with the highest R₂O₃ contents the authors agree with E.M. Levin and St. Block [J. Amer. Cer. Soc. 40 (1957) pp 95-106, 113-118, 41 (1958) pp 49-54]. For extending Levin and Block's calculations to trivalent kations the authors used the oxygen-volume method. If the binding force between the modifier kations and the oxygen atoms is higher than the authors speak of Type A. The binding force of the tested systems was between 3/6 and 3/8. In the case of Type A, one oxygen atom is coordinated with two modifier atoms. If the number of oxygen atoms (N_O) is known, the formula for the composition limit of a modifier-rich batch for trivalent modifier kations is

$$R_2O_3 \frac{N_O - 1.5}{2} SiO_2 \quad (4)$$

The article was translated by H. Frahn and edited by P.-O. Kunth (Berlin). There are 2 figures and 1 table.

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Liquid separations in the systems ...

G/005/62/000/CO4/CO2/CO2
D029/D109

ASSOCIATION: Institut fuer Silikatchemie der Akademie der Wissenschaften
der USSR (Institute for Silicate Chemistry of the Academy
of Sciences of the USSR).

Card 3/3

S/062/62/000/004/001/013
B110/B101

AUTHORS: Grebenshchikov, R. G., and Toropov, N. A.
TITLE: New data on the phase diagram of the system barium
oxide - silica

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye
khimicheskikh nauk, no. 4, 1962, 545-553

TEXT: In the system $\text{BaO} - \text{SiO}_2$, the heterogeneous equilibrium in the
section $\text{Ba}_2\text{Si}_3\text{O}_8 - \text{BaSi}_2\text{O}_5$ (58-67 mole% SiO_2) was investigated by:
(1) crystal-optical, and (2) X-ray structural analyses. (1) was carried
out with the Na_D line, and (2) between 20 and 1400°C with CuK_α radiation
on an X-ray ionizing apparatus, and in 3PC-3 (VRS-3) chambers with MoK_α .
The phase state of fritted samples (≈ 58.5 -66.67 mole% of SiO_2) was
determined from the dependence of the refractive indices n_g^D and n_p^D on
the composition: There is a continuous variation in refractive indices

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S/062/62/000/004/001/013
B110/B101

New data on the phase diagram ...

at 58.5-62.5% of SiO_2 . $n_g^D = 1.650-1.631$; $n_p^D = 1.630-1.612$. There are homogeneous, birefringent, prolate prisms with direct extinction and distinct cleavage along the longer axis. Phases of varying composition on the basis of $\text{Ba}_2\text{Si}_3\text{O}_8$ are observed here. There are two phases between 62.5 and 66.67%: (1) a solid $\text{Ba}_2\text{Si}_3\text{O}_8$ solution of saturated composition, stoichiometrically similar to $3\text{BaO} \cdot 5\text{SiO}_2$, and (2) BaSi_2O_5 . Refractive indices: $n_g^D = 1.631$ (1), and $n_p^D = 1.596$ (2). The maximum of the liquidus of the system $\text{BaO} - \text{SiO}_2$ (Fig. 4) at 1447°C corresponds to $\text{Ba}_2\text{Si}_3\text{O}_8$. Two polymorphous varieties have been found for BaSi_2O_5 : (1) β - BaSi_2O_5 (sanbornite) which is stable at low temperatures and standard conditions, (2) α - BaSi_2O_5 which is stable from $> 1350^\circ\text{C}$ to the melting point (1420°C). The solubility of BaO in α - BaSi_2O_5 increases with increasing temperature up to the peritectic reaction at 1425°C . X-ray ionization powder patterns of samples twice annealed at 1415°C

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New data on the phase diagram ...

showed considerable melting for BaSi_2O_5 , $\text{BaSi}_2\text{O}_5 + 2/15$ mole% of BaO (65.2 mole% of SiO_2), and $\text{BaSi}_2\text{O}_5 + 4/15$ mole% of BaO (63.8 mole% of SiO_2).

This conversion from equilibrium to the solid phase is only due to the peritectic reaction $\text{Ba}_2\text{Si}_3\text{O}_8$ solid sol. $\rightleftharpoons \text{BaSi}_2\text{O}_5$ solid sol. + liq (boundary line at 1425°C). The formation of a great number of silicates is attributed to the condensation tendency of the silicon - oxygen anions when the $\text{BaO} : \text{SiO}_2$ ratio changes. The phases of varying composition

on the basis of $\text{Ba}_2\text{Si}_3\text{O}_8$ may be condensation products of: (1)

$[\text{Si}_6\text{O}_{16}]_\infty^{8-}$ bands and/or (2) $[\text{Si}_2\text{O}_6]_\infty^{4-}$ chains. Thus, $5\text{BaO} \cdot 8\text{SiO}_2$ may be:

$[\text{Si}_6\text{O}_{16}]_\infty^{8-} + [\text{Si}_2\text{O}_6]_\infty^{4-} - 0 = [\text{Si}_8\text{O}_{21}]_\infty^{10-}$, and $3\text{BaO} \cdot 5\text{SiO}_2$:

$[\text{Si}_6\text{O}_{16}]_\infty^{8-} + 2[\text{Si}_2\text{O}_6]_\infty^{4-} - 2 \cdot 0 = [\text{Si}_{10}\text{O}_{26}]_\infty^{12-}$. It is assumed that $\text{Ba}_2\text{Si}_3\text{O}_8$, $3\text{BaO} \cdot 5\text{SiO}_2$, and $5\text{BaO} \cdot 8\text{SiO}_2$ as links of the same series of solid

solutions and as individual compounds be different condensation products

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New data on the phase diagram ...

of the metasilicate chains. Every compound may form discrete homogeneous regions (limited solid solutions). The crystallochemical similarity of the individual structural elements of the $\text{Ba}_2\text{Si}_3\text{O}_8$ and BaSi_2O_5 anions and their similar lattice parameters prove that the phases of varying composition in the interval $\text{Ba}_2\text{Si}_3\text{O}_8$ - BaSi_2O_5 are submicrocrystalline nuclei formed by interstratification of the structural elements $\text{Ba}_2\text{Si}_3\text{O}_8$ and BaSi_2O_5 in various ratios. There are 6 figures and 3 tables.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR
(Institute of Silicate Chemistry of the Academy of Sciences USSR)

SUBMITTED: February 5, 1961

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S/062/62/000/005/001/006
B110/B101

AUTHORS: Toropov, N. A., Galakhov, F. Ya., and Konovalova, S. F.

TITLE: Silicates of rare-earth elements. 9. Solid solutions between yttrium and erbium silicates

PERIODICAL: Akademiya nauk SSSR. Izvestiya. Otdeleniye khimicheskikh nauk, no. 5, 1962, 738-743

TEXT: The systems $Y_2O_3 \cdot SiO_2$ - $Er_2O_3 \cdot SiO_2$; $2Y_2O_3 \cdot 3SiO_2$ - $2Er_2O_3 \cdot 3SiO_2$, and $Y_2O_3 \cdot 2SiO_2$ - $Er_2O_3 \cdot 2SiO_2$ were investigated. The samples were produced from the respective oxides in accordance with I. A. Bondar' (Izv. AN SSSR, Otd. khim. n. 1962, 377; ibid., 1962, 383), heated in a platinum furnace and a vacuum microfurnace, and examined by microscope and X-ray analysis. Results: (1) The phase diagrams of diortho- and orthosilicates of yttrium and erbium are similar, and large zones of solid solutions are formed in both. (2) The interruption of reciprocal solubility is a small section in the middle of a few tenths percent. According to Rozeboom, they belong to the 5th type of diagrams with solid

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Silicates of rare-earth elements. 9. ...

solutions. (3) There is a small field of primary crystallization of yttrium orthosilicate due to fusion of yttrium diorthosilicate during decomposition. The roentgenograms showed: (a) Pure yttrium silicates and their solid solutions with 40% erbium silicate display monotype roentgenograms. (b) If erbium silicate $\gg 60\%$, solid solutions form on the base of it. (c) Samples with equal silicate content (50%) yield a mixture of two solid solutions. (4) There is no interruption of solubility in oxyorthosilicates ($Y_2O_3 \cdot SiO_2 - Er_2O_3 \cdot SiO_2$). The liquidus curve of the continuous series of solid solutions has a minimum shifted toward erbium oxyorthosilicate (3rd Rozeboom type). As the two elements belong to different structural sub-groups, the formation of a continuous solid solution can be explained by the low packing density of the structural elements. However, as in diortho and orthosilicate systems, the minimum also points to a tendency toward interrupting solubility. Different silicate types of the same (yttrium and erbium) rare-earth elements form diagrams of different types of solid solutions among one another. The slight difference (1.9%) of the ionic radii of yttrium and erbium, on the one hand, favors the formation of continuous solid

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solutions, but the structural difference of yttrium and erbium silicates, on the other, is an obstacle to it. As a result, different types of silicates of the same rare-earth elements form either continuous or limited solid solutions among one another. There are 4 figures and 3 tables.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR
(Institute of Silicate Chemistry of the Academy of
Sciences USSR).

SUBMITTED: October 31, 1961

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S/078/62/007/003/002/019
B110/B138

AUTHOR: Toropov, N. A.

TITLE: Tasks of Soviet inorganic chemistry in the light of the resolutions of the XXII Party Congress of the CPSU. Current problems of modern theoretical and experimental silicate chemistry

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 3, 1962, 452 - 453

TEXT: The program approved by the XXII Party Congress prescribes the development of new high-efficiency types of glass and glass-like plastics, glass-crystalline substances, high-duty concretes and mortars, new electrical ceramics and high-refractory materials, of which requires further research in the general, physical, and colloidal chemistry of silicates. Progress in the theoretical chemistry of vitreous systems, including rare and rare-earth elements, will lead to the development of luminescent, fire-proof, heat and radiation-resistant types of glass of high chemical and mechanical strength, and many of her types for instruments, radio engineering, and telemechanics. Studies on solid state physics and glass crystalli-

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Tasks of Soviet inorganic...

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zation are being conducted at the Institut khimii silikatov (Institute of Silicate Chemistry). Special importance is attached to the primary stages of crystallization, the conditions of primary chemical differentiation in molten glass and the effect of surface-active substances and catalysts on the crystallization process. The problems to be studied include: fine structures of anhydrous and hydrated silicates, atomic coordinates and type of chemical bond, the crystal lattice structure of oxide single crystals, structural defects causing diffusion and electrical conductivity, the ability of silicates to undergo solid-state transformations, and the use of catalysts and mineralizing additions. An urgent task is the development of a theory for the roasting and hydration setting and hardening of binding materials. This requires investigation of the rôle of the hydrogen bond in the formation of hydrate and anhydride phases. and of the mechanism of the colloidal crystallization structure. Important research work is being conducted, at the Institute of Silicate Chemistry, on thermodynamics, thermochemistry (high-temperature processes), resonance (nuclear, quadrupole; and paramagnetic resonance), new structure tests and spectroscopy (infrared, ultraviolet, X-ray and radiospectroscopy high-resolution electron microscopy, and high-temperature polarization microscopy).
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15.2.100

40137
S/078/62/007/007/005/013
B117/B101

AUTHORS: Toropov, N. A., Mao Chih-ch'ung

TITLE: Solid solutions of some orthosilicates of rare earth elements with strontium orthosilicate

PERIODICAL: Zhurnal neorganicheskoy khimii, v. 7, no. 7, 1962, 1632 - 1635

TEXT: The system $\text{Mg}_2(\text{SiO}_4) - \text{La}_4(\text{SiO}_4)_3$ which showed no homogeneous crystals and systems like $\text{Sr}_2(\text{SiO}_4) - \text{Me}_4(\text{SiO}_4)_3$ (Me = La, Nd, Y) were studied. Systems containing strontium orthosilicate were found to have homogeneity regions: $\text{Sr}_2(\text{SiO}_4) - \text{La}_4(\text{SiO}_4)_3$ and $\text{Sr}_2(\text{SiO}_4) - \text{Nd}_4(\text{SiO}_4)_3$ between 100 and 85% by weight of $\text{Sr}_2(\text{SiO}_4)$; $\text{Sr}_2(\text{SiO}_4) - \text{Y}_4(\text{SiO}_4)_3$ between 100 and 80% by weight of $\text{Sr}_2(\text{SiO}_4)$. This suggests the existence of solid solutions with limited solubility, which has been confirmed crystal-optically and radiographically. An increased content of La, Nd and Y orthosilicates was found to reduce the melting point and raise the refractive index. The formation of solid solutions was assumed to be due to slight differences

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Solid solutions of some...

S/078/62/007/007/005/013
B117/B101

in the ion radii of Sr, Nd, La, and Y. Thus, the absence of solid solutions in the system $\text{Mg}_2(\text{SiO}_4) - \text{La}_4(\text{SiO}_4)_3$ is probably due to the considerable difference in ion radii of Mg and La. There are 3 figures and 4 tables. ✓

SUBMITTED: September 4, 1961

Card 2/2

S/080/62/035/011/008/011
D204/D307

AUTHORS: Toropov, N.A., and Fedorov, N.F.

TITLE: Solid solutions of lanthanum orthosilicate in dicalcium silicate

PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 11, 1962,
2548 - 2550

TEXT: The system $\text{CaO-La}_2\text{O}_3\text{-SiO}_2$ (C-L-S) was studied, using $\gamma\text{-C}_2\text{S}$, prepared from analytically pure CaCO_3 and mountain crystal (99.9 % SiO_2), and La_2S_3 derived from La_2O_3 containing ± 0.75 % of other rare earth oxides. The materials were ground intimately in an agate mortar, bonded with dextrin into 2-3 mm dia cylinders and fired at 800-1000°C to eliminate the dextrin. The composition was varied from 0 to 100 % C_2S , in 5 % steps. The specimens were melted, homogenized, quenched and examined microscopically and by x-rays. Compositions containing $5-35 \pm 2.5$ wt. % La_2S_3 constituted a series of

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Solid solutions of lanthanum ...

S/080/62/035/011/008/011
D204/D307

solid solutions, with m.p.'s decreasing from 2100 ± 30 to 1910°C decreasing C_2S content. The presence of L_2S_3 stabilized various modifications of C_2S . Thus mainly $\beta - \text{C}_2\text{S}$ was found in compositions containing $< 10\%$ L_2S_3 , and both β and $\alpha' - \text{C}_2\text{S}$ in those with 10 - 15% C_2S . $\beta - \text{C}_2\text{S}$ disappeared when L_2S_3 was raised to 20%, and $\alpha' - \text{C}_2\text{S}$ was most pronounced in this region. Further increase of L_2S_3 promoted $\alpha - \text{C}_2\text{S}$. The above method is unsuitable for constructing phase diagrams, incorporating C_2S , since the structural transitions take place too rapidly. The m.p.'s were determined by a method developed at the Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry, AS USSR), by Toropov et. al. There are 2 tables.

SUBMITTED: March 23, 1962

Card 2/2

S/080/62/035/012/001/012
D444/D307

AUTHORS: Toropov, N.A. and Fedorov, N.F.
TITLE: The cementing properties of the different modifications of dicalcium silicate.
PERIODICAL: Zhurnal prikladnoy khimii, v. 35, no. 12, 1962, 2585-2588

TEXT: Published experimental information on hydraulic properties of dicalcium silicate is restricted to the β - and γ -forms. In the present work the β -form was stabilized with B_2O_3 or $Nd_4[SiO_4]_3$ and the α' - and α -forms with the latter compound. All specimens were free from uncombined CaO . The hydraulic activity was determined on specimens ground to a specific surface of about 3000 g/cm^2 [Abstracter's note: cm^2/g ?], the 3-, 7- and 28-day strengths being measured. X-ray diffraction patterns of hydration products showed only the lines of unhydrated materials. Some specimens, after standing for a day, were steam-cured in a laboratory autoclave for 8 hours at 8 atm. This treatment was effective for

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S/080/62/035/012/001/012
D444/D307

The cementing properties ...

all the modifications of dicalcium silicate, but with air hardening the γ - and α -forms stabilized with $\text{Nd}_4[\text{SiO}_4]_3$ have no cementing properties. The β - and α' -forms, on the other hand, show hydraulic activity, though with the α' -form this is very slight. There are 1 figure and 2 tables.

SUBMITTED: March 30, 1962

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32844

S/020/62/142/002/025/029

B101/B144

15.2.120

AUTHORS: Grebenshchikov, R. G., and Toropov, N. A.

TITLE: Phase diagram of the $\text{BaO} - \text{SiO}_2$ system in the range of high silica contents

PERIODICAL: Akademiya nauk SSSR. Doklady, v. 142, no. 2, 1962, 392 - 395

TEXT: The phase composition in the section $\text{B}_2\text{S}_3 - \text{BS}_2$ of the $\text{BaO} - \text{SiO}_2$ system was investigated. B_2S_3 and BS_2 were synthesized from BaCO_3 and amorphous silica at 1400°C (5-6 hrs), B_5S_8 and B_3S_5 either from the same initial substances or from ready-made B_2S_3 and BS_2 . The homogeneity of the products was tested as follows: by x-ray diffraction examination with a BPC-3 (VRS-3) camera with MoK_α radiation or with an ionization apparatus with Cu K_α radiation, and by crystal-optical examination by determining n^D . Results: Between ≈ 58.5 and 62.5 mole% SiO_2 , n^D_g drops steadily from

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S/020/62/142/002/025/029
B101/B144

Phase diagram of the ...

1.650 to 1.631, and N_p^D from 1.630 to 1.612. A break occurs at 62.5% SiO_2 owing to the formation of two phases: B_2S_3 and BS_2 . Between 62.5 and 66.67 mole% SiO_2 , N_g^D and N_p^D remain constant (1.631 and 1.596, respectively). X
As the melting points of B_2S_3 (1447°C) and BS_2 (1420°C) are too close to each other, no uniform crystallization could be expected from the melt. The phase diagram (Fig. 2) was therefore plotted by calcination of the samples just below the solidus point. Powder patterns showed a marked discrepancy between B_2S_3 and BS_2 , but only little difference between these substances and their solid solutions. Phases with different compositions on the basis of B_2S_3 are assumed to be formed by condensation of the molecular bands $[Si_6O_{16}]_{\infty}^{8-}$ or the molecular chains $[Si_2O_6]_{\infty}^{4-}$. The anions corresponding to the composition B_5S_8 might develop through the combination $[Si_6O_{16}]_{\infty}^{8-} + [Si_2O_6]_{\infty}^{4-} - O = [Si_8O_{21}]_{\infty}^{10-}$, and the anions for B_3S_5 through $[Si_6O_{16}]_{\infty}^{8-} + 2[Si_2O_6]_{\infty}^{4-} - 2O = [Si_{10}O_{26}]_{\infty}^{12-}$. The interrupted solubility
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B101/B144

Phase diagram of the ...

in the range $B_2S_3 - BS_2$ and the formation of a narrow range of phases with different compositions are brought about by reaching the condensation limit for the band structures: 5 meta-silicate chains, B_3S_5 . The great hardness (6-7) of $B_2S_3 - BS_2$ silicates and their low coefficient of thermal expansion permit (e. g., in the system $BaO - Al_2O_3 - SiO_2$) the production of new glassy and crystalline substances impervious to gamma rays. There are 3 figures and 8 references: 4 Soviet and 4 non-Soviet. The three references to English-language publications read as follows: P. Eskola, A. J. Sci., [5], 4, 331 (1922); R. S. Roth, E. M. Levin, J. Res. Nat. Bur. Stand., 62, no. 5, 193 (1959); R. M. Douglass, Am. Mineral., 43, no. 5 - 6, 517 (1958). X

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR (Institute of Silicate Chemistry of the Academy of Sciences USSR)

PRESENTED: July 14, 1961 by N. V. Belov, Academician

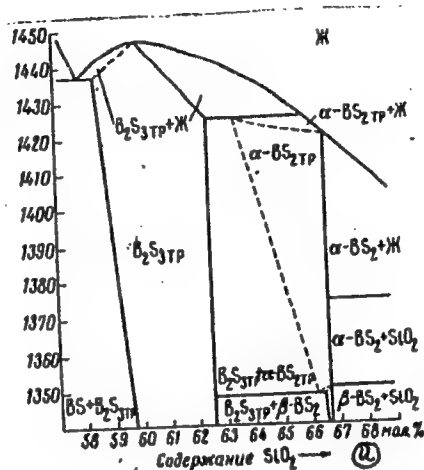
Card 3/4

Phase diagram of the ...

SUBMITTED: July 14, 1961

Fig. 2. Phase diagram of the BaO - SiO₂ system with 58 - 68 mole% SiO₂.

Legend: (a) content of SiO₂, mole%; TP = solid solution; * = liquid.



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TOROPOV, N.A., prof.; ANDREYEV, I.F.

[Elementary silicon] Elementarnyi kremnii; uchebnoe posobie.
Leningrad, Leningr. tekhnolog. in-t im. Lensoвета, 1963. 97 p.
(MIRA 16:12)
1. Chlen-korrespondent AN SSSR, deystvitel'nyy chlen Akademii
stroitel'stva i arkhitektury SSSR (for Toropov).
(Silicon)

AM4022016

BOOK EXPLOITATION

S/

Toropov, Nikita Aleksandrovich; Barzakovskiy, Valentin Pavlovich

High-temperature chemistry of silicate and other oxide systems (Vyssokotemperaturnaya khimiya silikatnykh i drugikh okisnykh sistem) Moscow-Leningrad, Izd-vo AN SSSR, 1963. 257 p., illus., biblio. Errata slip inserted. 2300 copies printed. (At head of title: Akademiya nauk SSSR. Institut khimii silikatov im. I. V. Grebenshchikova). Editor of the publishing house: V. D. Piastov; Artist: D. S. Danilov; Technical editor: G. P. Araf'yeva; Proofreaders: M. A. Gorilas, Sh. A. Ivanova, N. Z. Petrova

TOPIC TAGS: high temperature chemistry, silicates, oxide systems, vitreous materials, heat resistant materials, oxide whiskers, equilibrium crystallization, thermodynamics of oxide systems, solid electrolytes, diffusion, solid state reactions, alkaline earth oxides, Group three element oxides, Groups four through six

PURPOSE AND COVERAGE: This book is intended for the personnel in plant laboratories and scientific-research institutes, for undergraduate and graduate stu-

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dents specializing in inorganic chemistry, and the personnel in planning and design bureaus. Some of the most important results of theoretical and experimental work both at the Institut khimii silikator and of other Soviet and foreign scientists in this field are presented. Problems of the theory of developing new heat-resistant materials based on glass, flexible refractory fibers, are analyzed in special detail, and the latest data on heterogeneous equilibria and the thermodynamics of high-melting systems are presented.

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SUB CODE: EL, MA

SUBMITTED: 4Oct63

NR REF SOV: 125

OTHER: 490

DATE ACQ: 13Feb64

Card 5/5

MATVEYEV . M.A., prof., doktor tekhn. nauk, otv. red.; BUDNIKO
P.P., akademik, red.; TOROPOL, N.A., red.; GLUSHKOVA,
V.B., kand. khim. nauk, red.; ZUYEVA, V.F., nauchn. red.

[Silicates and oxides in the chemistry of high temperatures]
Silikaty i okisly v khimii vysokikh temperatur. Moskva, In-
t khimii silikatov im. I.V.Grebenshchikova. 1963. 382 p.
(MIRA 17:12)

1. Akademiya nauk Ukr.SSR (for Budnikov). 2. Chlen-
korrespondent AN SSSR (for Toropov).

ACCESSION NR: AT4019276

8/0000/63/003/001/0005/0009

AUTHOR: Toropov, N. A.

TITLE: The sequence of formation of crystalline phases of varying composition from silicate melts

SOURCE: Simpozium po stekloobraznomu sostoyaniyu. Leningrad, 1962. Stekloobraznoye sostoyaniye, vy*p. 1: Katalizirovannaya kristallizatsiya stekla (Vitreous state, no. 1: Catalyzing crystallization of glass). Trudy* simpoziuma, v. 3, no. 1. Moscow, Izd-vo AN SSSR, 1963, 5-9

TOPIC TAGS: glass, silicate, glass crystallization, crystalline phase, slag, glass structure, calcium alumina silicate

ABSTRACT: After reviewing the literature on the various techniques and materials used for the production of crystalline glass and glass ceramics, the author analyzes the crystallization process and the succession of crystalline phases (magnetite, plagioclase, pyroxene) which appear as the temperature drops, and suggests that the crystallization of blast furnace slags of varying composition can be followed on the basis of the phase diagram of the ternary system $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$, which usually includes the compositions of the basic, acidic, aluminosilicate and high-alumina slags. He then analyzes the course of

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ACCESSION NR: AT4019276

crystallization of silicate melts and suggests a 3-stage process: for a ternary system: separation of a first phase which is in equilibrium with the liquid, simultaneous separation of two phases which are in eutectic proportions, and then separation of a ternary eutectic. However, there are certain discrepancies between the results of this theory and experimental findings. An investigation of the microstructure of blast-furnace slags for which the chemical composition lies to the left of the CA-CAS₂ boundary line shows that, in many cases, the reaction of the initially separating helenite crystals with the liquid is not complete. In this case, an unstable system is created; the helenite does not dissolve completely and 5CaO.3Al₂O₃ crystals are formed. In the solid product, four crystallization phases are formed instead of three. The indicated microstructure of slag materials is repeated in other silicate systems (artificial and technical) and can serve for the interpretation of granitic (one-stage crystallization), prophyritic (two-stage crystallization), pegmatitic and other structures. Observations show that crystallization of the polycomponent silicate melts can proceed according to different crystallization schemes. Different ways of creating artificial nucleation centers, the subsequent thermal treatment of crystallized glass, the liquefaction of initially appearing metastable formations, the presence of impurities forming solid solutions with the crystalline phases, and many other processes are effective methods for introducing structural modifications.

Card 2/3

ACCESSION NR: AT4019276

ASSOCIATION: None

SUBMITTED: 17May63

SUB CODE: MT

DATE ACQ: 21Nov63

NO REF SOV: 003

ENCL: 00

OTHER: 002

3/3

Card

S/0000/63/003/001/0039/0041

ACCESSION NR: AT4019281

AUTHOR: Bondar', I. A.; Toropov, N. A.

TITLE: Determination of liquefaction in fluorinated slag and rare-earth silicate systems

SOURCE: Simpozium po stekloobraznomu sostoyaniyu. Leningrad, 1962. Stekloobraznoye sostoyaniye, vy* p. 1: Katalizirovannaya kristallizatsiya stekla (Vitreous state, no. 1: Catalyzing crystallization of glass). Trudy* simpoziuma, v. 3, no. 1. Moscow, Izd-vo, AN SSSR, 1963, 39-41

TOPIC TAGS: slag, rare earth, liquefaction, silicate, calcium fluoride, glass crystallization, ternary system, lanthanum, samarium, yttrium, ytterbium, immiscibility,

ABSTRACT: The effect of calcium fluoride on crystallization in the ternary system $\text{CaO-Al}_2\text{O}_3\text{-SiO}_2$ was studied in order to clarify the mechanism of production of glass-crystalline materials. CaF_2 was added in amounts of 1.5, 5 and 10% by weight. The addition of 5% CaF_2 decreased the viscosity by more than 50% and the temperature of liquefaction to 50-70C. The addition of 10% CaF_2 to the ternary system extended the area of separation. Electron microscopic studies showed that addition of lanthanum, samarium, yttrium and ytterbium silicates leads to the formation of immiscible glass over a wide range of temperature and concentration (35-95% by weight and 1650-2200C). Some of the

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ACCESSION NR: AT4019281

properties of the compositions from the areas of separation were investigated. Studies with the trivalent rare earth cations revealed a direct relationship between the limits of immiscibility and the dimensions of the cations. The effect of the addition of Al_2O_3 on the opalescence or transparency of glass was also determined. The mutual insolubility of components in the liquid phase results from the difference in the strength of the inter-molecular forces in the two immiscible liquids (expansion and compression coefficients, surface tension, heat of evaporation, etc.). Addition of a third component to separating molten metals determines the limit of the stable and metastable areas of immiscibility. Orig. art. has: 1 table and 2 figures.

ASSOCIATION: Institut metallurgii i keramiki AN KNR (Institute of Metallurgy and Ceramics, AN KNR)

SUBMITTED: 17May63

DATE ACQ: 21Nov63

ENCL: 00

SUB CODE: MT

NO REF SOV: 000

OTHER: 004

Card 2/2

S/063/63/008/002/001/015
A057/A126

AUTHOR: Toropov, N.A., Corresponding Member of the Academy of Sciences of the USSR

TITLE: Crystallochemistry and ceramics of aluminosilicates with cations of small size

PERIODICAL: Zhurnal vsesoyuznogo khimicheskogo obshchestva imeni D.I. Mendeleeva, v. 8, no. 2, 1963, 122 - 127

TEXT: The author discusses the problem of formation of new glass-crystalline materials called sitalls which correspond to the requirements of the ceramic industry, but are manufactured by means of the glass technology based on systems formed from aluminosilicates with small sized cations. Such systems were investigated before in papers by H. Saalfeld, E.A. Bush, F.A. Hummel, F.G. Giller, and many others by comparing structural and ceramic properties of materials on the basis of eucryptite, cordierite and other aluminosilicate phases. Attention was paid to crystalline phases with quartz-like structures in the systems $\text{Li}_2\text{O} - \text{Al}_2\text{O}_3 - \text{SiO}_2$ and $\text{MgO} - \text{Al}_2\text{O}_3 - \text{SiO}_2$ which are investigated by the au-

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Crystallochemistry and ceramics of

S/063/63/008/002/001/015
A057/A126

thor in relation to literature data. It can be stated that the introduction of the side-ions Li^+ and Mg^{2+} into the crystal lattice of a silica modification stipulates the formation of metastable quartz-like structures at temperatures above 870°C . On the other hand it decreases the temperature of the polymorphic transition of $\alpha \rightarrow \beta$ quartz to considerably lower temperatures. Due to the similar ionic radii of Fe^{2+} and Mg^{2+} , the system $\text{FeO} - \text{Al}_2\text{O}_3 - \text{SiO}_2$ showed analogous properties. In correspondence to observations made with the three mentioned systems it can be assumed that the effect of mineralizers in the process of structurization, say of a Dinas refractory material, can be attained in several cases also by introducing small ions into the quartz lattice with corresponding changes in the mechanism and kinetics of the subsequent regeneration into cristobalite and tridymite. There are 5 figures and 2 tables.

ASSOCIATION: AN SSSR (AS USSR)

Card 2/2

"APPROVED FOR RELEASE: 08/31/2001

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APPROVED FOR RELEASE: 08/31/2001

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"APPROVED FOR RELEASE: 08/31/2001

CIA-RDP86-00513R001756330005-1

AS ...

APPROVED FOR RELEASE: 08/31/2001

CIA-RDP86-00513R001756330005-1"

S/030/63/000/003/013/014
B117/B186

AUTHORS: ~~Toropov, N. A.~~, Corresponding Member AS USSR, Glushkova,
V. B., Candidate of Chemical Sciences

TITLE: Silicates and oxides in high-temperature chemistry
(Conference in Leningrad)

PERIODICAL: Akademiya nauk SSSR. Vestnik, ³³⁻no. 3, 1963, 134-135

TEXT: From November 21 to 24, 1962 a conference took place in Leningrad on the study of the behavior of substances at high temperatures and on pertinent experimental methods. The conference had been convened by the Institut khimii silkatov im. I. V. Grebenshchikova Akademii nauk SSSR (Institute of Silicate Chemistry imeni I. V. Grebenshchikov of the Academy of Sciences USSR) and was attended by representatives of 82 scientific research institutions, universities and, industrial enterprises from more than 20 towns of the USSR. The director of the Institute, Corresponding Member N. A. Toropov, gave a survey on the present state of the investigations into the physical and chemical properties of ceramic substances in the USSR. N. V. Belov spoke about the crystallo-
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S/030/63/000/003/013/014
B117/B186

Silicates and oxides in high-...

chemical explanation of some characteristic features in the behavior of oxides at high temperatures. S. M. Ariya and M. P. Morozova dealt with the rules governing the changes in phase composition in systems "transition metal - oxygen" with temperature increase. The synthesis and the properties of compounds of rare and rare-earth elements and the effect of the gaseous medium on reactions in solid phase in systems with oxides of different valencies was dealt with by A. I. Leonov, N. A. Godina, I. A. Bondar', V. A. Bron, N. V. Semkina, Ye. I. Smagina. The effect of Ba^{+2} , Ca^{+2} , and Be^{+2} in quantities of 0.1 - 0.5 atom%, the kinetics of mullite formation in aluminosilicate mixtures jointly precipitated were reported by P. P. Budnikov, T. N. Keshinyan, A. V. Volkova. The study of silicates of the alkaline earth metals was described by R. G. Grebenshchikov, L. Ya. Markovskiy, A. A. Kolpakov, Yu. P. Sapozhnikov. Studies of the thermodynamic properties of oxides and salts by the electrochemical method at 800 - 1150°C were reported by T. N. Rezhukhina, V. A. Levitskiy, A. N. Golubenko. The diffusion of molybdenum and iron into various materials was treated by A. I. Borisenko, V. I. Izvekov and N. S. Gorbunov. So was the analysis of thermodynamic calculations of reactions in solid phase at high

Card 2/4

Silicates and oxides in high-...

S/030/63/000/003/013/014
B117/B186

temperatures by V. B. Glushkova. Problems in the breeding of mono-crystals of different silicate substances were dealt with at a special meeting by S. G. Tresvyatskiy, A. D. Fedoseyev, L. G. Grigor'yeva, T. A. Makarova, D. P. Grigor'yev. Also, Ya. V. Klyucharev spoke about the studies of phase transformations and properties of high-temperature compounds; G. V. Kukolev, M. T. Mel'nik, N. N. Shapovalova about the properties of low-basic calcium aluminates; A. K. Karklit, Ye. R. Skuye, I. A. Kosheleva, B. A. Polonskiy on the sintering and the crystallization of molten quartz in hot pressing, Lectures on apparatus: N. V. Golubtsov "Some instruments for studying vacuum processes"; P. F. Rumyantsev "Application of the high-temperature microscope for studying silicates". Lectures on methods: E. K. Keler: on the application of complex thermography for studying high-temperature processes; V. V. Fesenko, A. S. Bolgar: on the investigation of physical and physico-chemical properties of low-melting compounds at 3500°K; E. E. Shpilman, A. Ye. Shoyndlin, N. V. Boyko, V. Ya. Chekhovskoy, V. A. Petrov, on the determination of the thermal conductivity at 1500°C and some thermo-physical properties up to 2500°C; S. F. Pal'guyev A. D. Neuymin spoke

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Silicates and oxides in high-...

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B117/B186

about the investigation of the nature of conductance and conductivity of highly refractory oxides. In this conference a large contribution was made to the coordination of the work of scientific research institutions, universities, and industrial enterprises in the field of silicates and oxides in high-temperature chemistry.

Card 4/4

TOROPOV, N.A.; SHIRVINSKAYA, A.K.

Interaction of calcium germanates with water at room temperature.
Zhur. prikl. khim. 36 no.4:717-724 Ap '63. (MIRA 16:7)

(Calcium germanates)

(Hydration)

GREBENSHCHIKOV, R.G.; TOROPOV, N.A.

Energy of the complex crystal lattice of silicates. Dokl. AN
SSSR 151 no.1:102-105 J1 '63. (MIRA 16:9)

1. Institut khimii silikatov AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Toropov).
(Alkaline earth silicates) (Crystal lattices)

L 16142-63

EWP(q)/EWT(m)/BDS AFFTC/ASD JD/JG

ACCESSION NR: AP3005442

S/0020/63/151/005/1114/1117

AUTHORS: Toropov, N. A. (Corr. member AN SBR); Boykova, A. I.

TITLE: Solid solutions of tricalcium silicate with yttrium oxyortho-silicate

SOURCE: AN SSSR. Doklady*, v. 151, no. 5, 1963, 1114-1117

TOPIC TAGS: silicate solid solution, tricalcium silicate, triclinic tricalcium silicate, DTA, monoclinic tricalcium silicate, trigonal tricalcium silicate, polymorphic conversion, tricalcium phosphate

ABSTRACT: Mixtures of $3\text{CaO} \cdot \text{SiO}_2$ containing 0.5; 1; 2-8; 10; 12 and 15 weight % $\text{Y}_2\text{O}_3 \cdot \text{SiO}_2$ were investigated. Heating to 1400-1450C for 2-3 hours assured complete reaction. A series of solid solutions were formed between the two silicates up to 6-7% of the $\text{Y}_2\text{O}_3 \cdot \text{SiO}_2$; in higher concentrations the latter appeared as an independent phase. The solutions gave 2 polymorphic conversions, as does pure $3\text{CaO} \cdot \text{SiO}_2$: from triclinic to monoclinic at about 920C, and to trigonal at about

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L 16142-63

ACCESSION NR: AP3005442

2

970C. Differential thermal analysis data, IR and X-ray spectra were studied. "Chemical analysis was carried out by F. N. Smelovski in the analytical laboratory of the Institute." "Authors express thanks to G. P. Stavetsko for obtaining spectra of investigated materials." Orig. art. has: 1 table and 3 figures.

ASSOCIATION: Institut khimii silikatov im. I. V. Grebenshchikova
Akademii nauk SSSR (Institute of silicate chemistry)

SUBMITTED: 06May63

DATE ACQ: 06Sep63

ENCL: 00

SUB CODE: CH, MA

NO REF SOV: 003

OTHER: 003

Card 2/2

TOROPOV, Nikita Aleksandrovich; BULAK, Lidiya Nikolayevna;
SHAGIROVA, I.M., red.

[Course in mineralogy, crystallography, and petrography
with principles of geology] Kurs mineralogii, kristallogra-
fii i petrografii s osnovami geologii. Izd.2. Moskva,
Vysshaya shkola, 1964. 443 p. (MIRA 17:11)

BAZHENOV, N.M. [deceased]; KOL'TSOV, A.I.; KIRPICHNIKOVA, N.P.; RYSKIN, Ya.I.;
STAVITSKAYA, G.P.; BOYKOVA, A.I.; TOROPOV, N.A.

Infrared absorption spectra, proton magnetic resonance, and
structure of dicalcium silicates α - and β -hydrates. Izv. AN
SSSR. Ser.khim. no.3:409-416 Mr '64. (MIRA 17:4)

1. Institut khimii silikatov im. I.V.Gregenshchikova AN SSSR i
Institut vysokomolekulyarnykh soyedineniy AN SSSR.

TORCPOV, N. A. and TYKACHINSKIY, Y. D.

"Preparation of new microcrystalline materials with reduced brittleness"

(Institute of Silicate Chemistry)

At the Division of Physical Chemistry and Technology of Inorganic Materials, Acad. Sci. USSR, a scientific council on the problem of silicates has been established. The Council is a coordinating body for basic scientific research on silicates, glass, fiber glass, stoneware, refractory and superrefractory materials, and coatings. The purpose of the Council is primarily to contribute to the improvement of the strength and impact resistance of existing materials. In 1963, the council held two sessions.
(Steklo i keramika, no. 6, 1964, 48-49)

TOROPOV, N.A.; BONDAR', I.A.; GALAKHOV, F.Ya.; NIKOGOSYAN, Kh.S.; VINOGRADOVA,
N.V.

Phase equilibria in the system yttrium - alumina. Izv. AN SSSR.
Ser. khim. no. 7:1158-1164 J1 '64. (MIRA 17:8)

1. Institut khimii silikatov imeni Grebenshchikova AN SSSR.

ACCESSION NR: AP4009351

S/0078/64/009/001/0156/0163

AUTHORS: Toropov, N. A.; Fedorov, M. F.

TITLE: Solid solutions in the calcium orthosilicate - neodymium orthosilicate system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 1, 1964, 150-163

TOPIC TAGS: dicalcium silicate, calcium orthosilicate, neodymium orthosilicate, silicate solid solution

ABSTRACT: This is a continuation of the authors' work on calcium orthosilicate and yttrium orthosilicate interaction at high temperatures (Zh. Prikl. khimii No. 10, 2150 (1962)). Dicalcium silicate in γ -form was used. Neodymium oxide and silica were introduced in a 2:3 proportion. Preliminary calcining was done at 800-1000C. Annealing was done in argon atmosphere in a vacuum micro furnace. Hardening for 15 sec to 10 min took place at 1700-2200C. Samples slides were microscopically studied in immersion and radiographed by the ionization recording method. Up to 40% (by weight) neodymium orthosilicate content in the solid solution, the latter is uniform.

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ACCESSION NR: AP4009351

in reflected light. Above that level two phases are observable by microphotography indicating the breakdown of the solid solution. Intermediate proportions are radiographically analyzed in detail. The stabilizing action by neodymium orthosilicate on high temperature forms of dicalcium silicate is observed, as well as the formation of "complex" Ca_2SiO_4 crystals, macroscopically homogeneous and corresponding a microheterogeneous two-phase state. Orig. art. has: 2 Figures, 3 Tables

ASSOCIATION: None

SUBMITTED: 04Jan63

DATE ACQ: 07Feb64

ENCL: 00

SUB CODE: CH

NR REF SOV: 008

OTHER: 018

Card 2/2

ACCESSION NR: AP4039399

S/0070/64/009/003/0408/0410

AUTHORS: Margolis, N. V.; Toropov, N. A.; Udalov, Yu. P.

TITLE: X-ray analysis of praseodymium and samarium aluminates

SOURCE: Kristallografiya, v. 9, no. 3, 1964, 408-410

TOPIC TAGS: x ray analysis, crystallographic analysis, praseodymium, lattice parameter, samarium, aluminate, camera RKOP, camera RKU, goniometer KFOR

ABSTRACT: The structure of praseodymium and samarium aluminates was studied in order to verify the hypothesis stating that the perovskite-type structures undergo transformations producing valuable physical properties. Powders and single crystals of the aluminates were prepared in Institut khimii silikatov AN SSSR (Institute of Silicate Chemistry, Academy of Sciences SSSR). Praseodymium and samarium were studied previously by S. Geller and V. B. Balla (Acta Crystallog., 9, 1019, 1956) who referred the first aluminate to the rhombohedral system with lattice parameters: $a = 5.307 \text{ \AA}$, $\alpha = 60.33^\circ$, and the second to the rhombic system with $a = 5.285$; $b = 5.290$; $c = 7.473 \text{ \AA}$. During the investigation the crystal symmetry

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ACCESSION NR: AP4039399

was photographed by a RKOP camera. A more accurate picture was obtained in an x-ray goniometer KFOR. It was established on the basis of the x-ray pattern analysis that praseodymium crystallized in the tetragonal rather than rhombohedral system and that its lattice parameters were $a = b = 3.74 \pm 0.01 \text{ \AA}$, $c = 3.76 \pm 0.1 \text{ \AA}$. The Laue diffraction pattern of the samarium crystal showed that it had a diffraction symbol $2/mn$. According to the Geller and Balla choice of the coordinate axes, the samarium crystal should have the third order axes, but the presence of such axes in samarium was not sustained. However, the investigation showed the presence of clearly defined second-order axes and less clearly defined fourth-order axes. It was decided to take the edges of the perovskite cell as the direction of the coordinate axes. For better results, the elementary cell constant 3.72 \AA was doubled (in the plane perpendicular to the Z axis). The results proved that samarium crystallized in the rhombic system with the lattice parameters $a = b = 7.46 \pm 0.01$; $c = 7.43 \pm 0.01 \text{ \AA}$. "We express our gratitude to V. A. Ioffe for the experimental material." Orig. art. has: 2 tables.

ASSOCIATION: Leningradskiy tekhnologicheskii institut im. Lensovet (Leningrad Technological Institute)

Card 2/32

s/0078/64/009/005/1300/1302

ACCESSION NR: AP4036974

AUTHOR: Toropov, N. A.; Sirazhiddinov, N. A.

TITLE: The MgAl sub 2 O sub 4 -LaAlO sub 3 system

SOURCE: Zhurnal neorganicheskoy khimii, v. 9, no. 5, 1964, 1300-1302

TOPIC TAGS: MgAl sub 2 O sub 4 LaAlO sub 3 system, phase diagram, x ray analysis, microstructure, binary system, simple eutectic, magnesium aluminate containing system, lanthanum aluminate containing system

ABSTRACT: The phase diagram of the $MgAl_2O_4$ - $LaAlO_3$ system was constructed (fig. 1) from x-ray and microstructural studies (photographs are included in the article). The system has a diagram of a binary system of the simple eutectic type without the formation of intermediate chemical compounds or solid solutions. Orig. art. has: 3 figures.

ASSOCIATION: None

Card

1/3

ACCESSION NR: AP4036974

SUBMITTED: 08Oct63

DATE ACQ: 05Jun64

ENCL: 01

SUB CODE: IC

NO REF SOV: 003

OTHER: 001

Card

2/3

ACCESSION NR: AP4036974

ENCLOSURE: 01

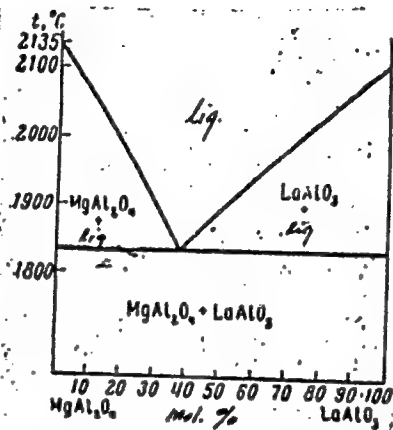


Fig. 1. Phase diagram of the system MgAl_2O_4 - LaAlO_3

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Card

AUTHOR: Toropov, N. A.; Fedorov, N. F.

Card 2/3

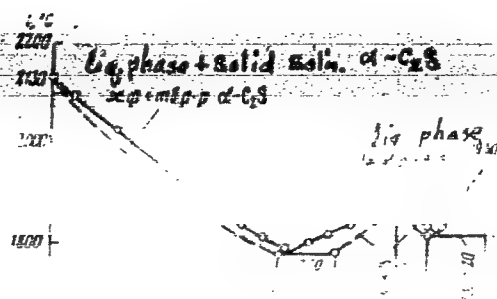
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APPROVED FOR RELEASE: 08/31/2001

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ENCLOSURE 01

0

TOROPOV, N.A.; RUMYANTSEV, P.F., kand.tekhn.nauk

Kinetic of the physicochemical processes of the formation of
cement clinker. TSement 30 no.6:3-5 N-D '64.

(MIRA 18:1)

1. Institut khimii silikatov AN SSSR. 2. Chlen-korrespondent
AN SSSR (for Toropov).

TOROPOV, N.A.

Structure of inorganic glasses; all-Union conference in
Leningrad. Vest. AN SSSR 34 no.7:110-111 J1 '64
(MIRA 17:8)

1. Chlen-korrespondent AN SSSR.

TOROPOV, N.A.; RUMYANTSEV, P.F.; FILIPOVICH, V.N.

Kinetics of dissolution of CaO , $3\text{CaO} \cdot \text{SiO}_2$, $2\text{CaO} \cdot \text{SiO}_2$ in the
liquid phase of cement clinker. Zhur. fiz. khim. 38 no.4:
974-978 Ap '64. (MIRA 17:6)

1. Akademiya nauk SSSR i Leningradskiy institut khimii silikatov.

ACCESSION NR: AP4038526

S/0020/64/156/003/0619/0621

AUTHOR: Toropov, N. A. (Corresponding member); Bondar', I. A.; Piryut'ko, M. M.

TITLE: A new garnet type crystalline modification of yttrium orthosilicate.

SOURCE: AN SSSR. Doklady*, v. 156, no. 3, 1964, 619-621

TOPIC TAGS: yttrium orthosilicate, crystallography, x ray diffraction, polymorphism, garnet type crystalline modification

ABSTRACT: In the study of the phase diagram of the binary system, yttrium oxide-silica, the authors were the first to obtain a polycrystalline yttrium orthosilicate. In further studies yttrium silicate single crystals were grown from potassium fluoride solution. The obtained crystals have the shape of symmetrical isometric polyhedrons with well developed polished faces. These crystals were examined goniometrically at the Department of Crystallography of the Leningrad State University im. Zhdanov. From the crystal habit one can observe two simple forms: rhombic dodecahedral and tetragonal trioctahedral. The chemical analysis of these single crystals indicated that they correspond to the formula $2Y_2O_3 \cdot 3SiO_2$. The optical analysis showed that crystals of this compound are isotropic, which

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ACCESSION NR: AP4038526

corresponds to their general garnet appearance. The index of refraction of single crystal material was higher than in the polycrystalline form of the same substance. Studies with high temperature microscope have shown that the new garnet-like form of $2Y_2O_3 \cdot 3SiO_2$ upon heating is transformed to anisotropic modification at 1550 C. It was not possible to obtain the reversible transformation which shows the monotropic character of this transformation. X-ray diffraction studies of single crystals substantiated the existence of the structural difference of this form of yttrium orthosilicate from the polycrystalline hexagonal modification. Orig. art. has: 2 figures.

ASSOCIATION: Institut khimii silicatosv Akademii nauk SSSR (Institute of Chemistry of Silicates, Academy of Sciences SSSR)

SUBMITTED: 20Jan64

SUB CODE: SS, IC

NO REF SOV: 002

ENCL: 00

OTHER: 003

Card 2/2

S/0020/64/156/004/0865/0868

ACCESSION NR: AP4041154

AUTHOR: Boykova, A. I.; Toropov, N. A. (Corresponding member); Kuznetsov, A. K.

TITLE: Rare earth silicates as crystallochemical indicators. Solid solutions of tricalcium silicate with lanthanum oxyorthosilicate

SOURCE: AN SSSR. Doklady*, v. 156, no. 4, 1964, 865-868

TOPIC TAGS: tricalcium silicate, lanthanum oxyorthosilicate, $3\text{CaO} \cdot \text{SiO}_2$ sub 2, La sub 2 O sub 3 $\cdot \text{SiO}_2$ sub 2, solubility, solid solution, rare earth silicate, crystallochemical indicator, x ray analysis, crystalloptical analysis, differential thermal analysis, isomorphism, polymorphic transition, beta $2\text{CaO} \cdot \text{SiO}_2$ sub 2, gamma $2\text{CaO} \cdot \text{SiO}_2$ sub 2, heat treatment

ABSTRACT: Compositions of $3\text{CaO} \cdot \text{SiO}_2$ with 1-25% $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ were subjected to crystalloptical, x-ray, differential thermal and chemical analyses. The apparent limit of solubility of $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ in the $3\text{CaO} \cdot \text{SiO}_2$ is 5%, but an increase in light refraction was noted as the former was increased to 12%, indicating that saturation of the solid solution continues beyond the limit of phase homogeneity (but the process is slow in attaining equilibrium) and the limit of the solid solution is

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ACCESSION NR: AP4041154

somewhat higher than 5% $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$. Beta- and gamma- $2\text{CaO} \cdot \text{SiO}_2$ were present in all the samples along with the solid solution, their amount increasing with an increase in $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ content. This is explained by the isomorphic exchange $3\text{Ca}^{2+} \rightleftharpoons 2\text{La}^{3+}$. The larger the amount of the $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$, the greater the number of Ca vacancies and the greater the amount of Ca above the stoichiometric 3:1; 3-4% excess CaO over the stoichiometric was found. The formation of the solid solution is a complex process involving introduction of Ca ions into the lattice to fill the vacancies as well as substitution by La ions. Differential thermal analysis showed the complex polymorphic transformations depended on $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ concentration and heat treatment. The annealed samples show essentially the same two endothermic effects in the 800-1000°C range as pure $3\text{CaO} \cdot \text{SiO}_2$, shifted somewhat toward lower temperatures with increase in $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ content; in the hardened compositions containing over 3% $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ an additional endothermic effect appears. Examination of the intensity of the x-ray ionization curves showed the triplet lines characteristic of $3\text{CaO} \cdot \text{SiO}_2$ appeared in annealed lanthanum-containing compositions, but the maxima shifted and the aspect of the lines changed with increasing $\text{La}_2\text{O}_3 \cdot \text{SiO}_2$ content in hardened compositions. Orig. art. has: 1 table and 3 figures.

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ACCESSION NR: AP4041154

ASSOCIATION: Institut khimii silikatov, Akademii nauk SSSR (Institute of Silicate
Chemistry Academy of Sciences SSSR)

SUBMITTED: 14Feb64

DATE ACQ: 00

ENCL: 00

SUB CODE: GC, IC

NO REF SOV: 004

OTHER: 003

Card 3/3

ACCESSION NR: AP4040952

S/0020/64/156/005/1127/1129

AUTHOR: Toropov, N.A. (Corresponding member AN SSSR); Mandal, Gurudas

TITLE: Solid lanthanum and yttrium diorthosilicate solutions

SOURCE: AN SSSR. Doklady*, v. 156, no. 5, 1964, 1127-1129, side of insert facing p. 1128

TOPIC TAGS: lanthanum, yttrium, lanthanum diorthosilicate, yttrium diorthosilicate, rare earth oxide, La sub 2 O sub 3, SiO sub 2

ABSTRACT: Present work is devoted to a study of the phase relationships between lanthanum and yttrium diorthosilicates related to the various structural groups of compounds of this type. Lanthanum trioxide, yttrium oxide and crystalline SiO_2 were used as the starting melts. The starting blends were prepared by a prolonged mixing of precisely weighed oxides in an agate mortar. Small cylinders were then pressed out of this mixture. They were then prefused in an electric arc. Subsequent heat treatments were done in an electric microfurnace described by F. Ya. Galakhov et al (Izv. AN SSSR, OKhN, No. 8, (1961), 1365). The furnace was graduated for the melting points of Pd, Pt and corundum. Accuracy of temperature measurement was $\pm 20^\circ\text{C}$. When conducting the experiments, the temperature was gradually increased up to the melting of the sample. The temperature was raised

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ACCESSION NR: AP4040952

another 150C after the sample had been melted, after which it was lowered to a given annealing temperature. A phase diagram for the system lanthanum diorthosilicate - yttrium diorthosilicate was constructed. It pertains to a type which is characterized by the presence in the system of a limited mutual solubility of the components in the solid phase. First of all, this condition is caused by the diversity of the diorthosilicates in the investigated structures. The area where the mixture of two solid solutions of a limited concentration exists takes up a large part of the diagram. Inasmuch as both components of the system melt inconsistently, areas of stable orthosilicates appear on the liquidus and solidus curves. "Authors express their thanks to I. A. Bondar' for valuable hints during the execution of this research." Orig. art. has: 3 figures.

ASSOCIATION: Institut khimii silikatov Akademii nauk SSSR
(Institute of Silicate Chemistry, AN SSSR)

SUBMITTED: 24Feb64

SUB CODE: IC

NO REF SOV: 009

ENCL: 00

OTHER: 000

Card 2/2

BOYKOVA, A.I.; TORPOV, N.A.

Stoichiometry and polymorphism of tricalcium silicate. Dokl.
AN SSSR 156 no.6:1428-1431 Je '64. (MIRA 17:8)

1. Institut khimii silikatov imeni Grebenshchikova. 2. Chlen-
korrespondent AN SSSR (for Toropov).

and yttrium-bearing minerals. Also, with the use of the analytical character-
istics of the mineral, it is possible to determine the amount of the mineral

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TOROPOV, N.A.; UDALOV, Yu.P.; GENKIN, G.A.

Role of the impurity cation in the process of selective etching of KBr and NaCl crystals. Dokl. AN SSSR 158 no.2:335-337 S '64.

(MIRA 17:10)

1. Leningradskiy tekhnologicheskii institut im. Lensovet. 2. Chlen-korrespondent AN SSSR (for Toropov).

GREBENSHCHIKOV, R.G.; TOROPOV, N.A.

Some aspects of crystallochemical energy of titanates and zirconates of
alkaline earth metals. Dokl. AN SSSR 158 no.3:710-713 S '64.

(MIRA 17:10)

1. Institut khimii silikatov im. I.V.Grebenshchikova AN SSSR. 2. Chlen-
korrespondent AN SSSR (for Toropov).

TOROPOVA, N.A., red.; FORAY-KOSHITSA, Ye.A., red.

[Structural transformations in glass at high temperatures] Strukturnye prevrashcheniia v steklakh pri povyshennykh temperaturakh. Moskva, Nauka, 1965. 259 p.
(MIRA 18:1)

1. Akademiya nauk SSSR. Institut khimii silikatov.